Preparing for the Silver Tsunami:

The Demand for Higher Education among Older Adults[†]

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Abstract

Over the next decade, Baby Boomers will be reaching retirement age in large numbers and the U.S. will be undergoing one of the most significant demographic shifts in its history. This demographic shift has important implications for the role of higher education as a provider of lifelong learning and for the changing composition of postsecondary institutions. Using data from the 2005 National Household Education Survey, the results of this study informs the higher education community about this emerging student market segment as a way to help us better respond to older adults' demand for formal learning in postsecondary institutions.

Key words: Educational demand, Older adults, Baby Boomers, Consumer preference theory, Hurdle model.

Over the next 10 years, Baby Boomers will be reaching retirement age in large numbers and the U.S. will be undergoing one of the most significant demographic shifts in our nation's history. According to the U.S. Census Bureau (2008a), between 2010 and 2020 the population age 55 or older is projected to increase by 28%, whereas the population under age 55 is projected to increase by only 10%. As a result, older adults will represent an increasing share of the total population, from 25% in 2010 to 29% in 2020. Although this demographic shift has important implications for the current course of public policies and programs in such areas as financial planning (e.g., Social Security, pensions and retirement saving) and health and wellness (e.g., Medicare and Medicaid), this shift also has important implications for the role of higher education as a provider of lifelong learning and for the changing composition of postsecondary institutions.

Postsecondary institutions have several strong motivations for understanding consumer demand for lifelong learning among this older adult population. The first motivation is that, compared to previous generations entering retirement age, Baby Boomers are expected to live longer and healthier lives, and they are abandoning traditional notions of retirement for a "third age" of life in which they continue to work and engage actively in new educational experiences and activities related to personal development and community involvement (American Council on Education, 2007, 2008). According to results of the New Face of Work Survey (MetLife Foundation /Civic Ventures, 2005), only 17% of adults ages 50 to 59—the leading Baby Boomers—plan to stop working after reaching the traditional retirement age of 65. In addition, 33% of adults ages 55 to 79 participate in some kind of formal learning such as credential programs, work-related courses, or courses for personal interest, whereas 69% engage in some form of informal learning such as participating in clubs or activity groups, or attending

conventions or conferences (U.S. Department of Education, National Center for Education Statistics, 2005). The educational preferences of this generation also appear to be well-aligned with the formal learning experiences offered in college settings. Older adults report that they are most interested in learning for personal development or to acquire advanced skills, and they have a strong preference for educational environments in which they engage in experiential learning and face-to-face interaction with teachers and other learners (AARP, 2000).

The second motivation that postsecondary institutions have for understanding the demand for lifelong learning among older adults is the projection that, over the next decade, the national pool of traditional-aged college students will increase at a slower rate, with some states likely experiencing a decrease in the number of traditional-aged students attending college (Western Interstate Commission for Higher Education, 2008). Similar to the demographic shifts in the 1970s—when large numbers of Baby Boomers were moving beyond traditional college age and postsecondary enrollments were anticipated to decline (Hossler & Bean, 1990)—institutions will again need to act creatively and strategically to tap into new pools of potential students in order to maintain enrollment levels and their current levels of funding. The Baby Boomer generation, which fueled college growth in prior decades, could be tapped again to maintain the headcounts and revenues of postsecondary institutions.

Although college leaders and educational policy makers are aware of the current demographic shifts, they do not appear to have yet responded to the educational demand of a growing segment of the population. According to a report by the American Council on Education (2007), approximately 40% of colleges in the U.S. do not actively reach out to older adults' educational needs. Older adults have educational preferences that align with the course content and learning environments of postsecondary institutions, yet over one-half (57%) of these

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potential students report never enrolling in a postsecondary institution to satisfy their educational demand (AARP, 2000).

One of the possible reasons why postsecondary institutions have yet to respond to current demographic changes is the lack of empirical information regarding the educational preferences of older adults. Research in higher education typically overlooks the learning experiences of adults by focusing on traditional-age students who enroll in credit-bearing courses (Donaldson & Townsend, 2007). The small body of research on the educational experiences of older adults is mostly limited to descriptive analyses appearing in policy reports (e.g., AARP, 2000; American Council on Education, 2007, 2008) that do not utilize multivariate statistics to account for the unique influence of background characteristics, other commitments and constraints, and price on enrollment decisions.

To help fulfill a need for more information on the educational demand of this market segment, this study uses data from the National Household Education Surveys Program of 2005 Adult Education Survey to explore the characteristics of older adults who choose to participate in formal coursework for personal interest or work-related reasons. Although some courses for personal interest or work-related reasons are offered for college credit, this type of formal learning is taken primarily on a non-credit basis and is not intended to be a part of a degree program. These courses are commonly offered at community colleges and at continuing education centers on four-year campuses, but such courses can also be taught by a number of other providers (e.g., private businesses, government agencies, public libraries, professional associations, and community or religious organizations) who compete with postsecondary institutions to meet educational demand.

Our focus on these types of courses is based on nationally representative data that suggests that the educational demand among older adults is not directed toward a postsecondary credential or degree. According to data from the National Household Education Surveys Program of 1999 (U.S. Department of Education, National Center for Education Statistics, 1999), at the end of the twentieth century, 16% of adults ages 55 to 79 participated in personal interest courses and 11% participated in work-related courses. By 2005, those shares had increased to 21% and 17%, respectively (U.S. Department of Education, National Center for Education Statistics, 2005). Over the same time period, however, the share of adults ages 55 to 79 in credential programs dropped from 3% in 1999 to 1% in 2005.

The results of this study can inform the higher education community about this emerging student market segment as a way to help colleges respond to their unique enrollment demand and to their potential barriers to accessing lifelong learning at these institutions.

Literature Review

Although there have been recent calls for more empirical research on the college choices and educational experiences of nontraditional college students (e.g., Pascarella, 2006; Perna, 2006), the academic community has yet to fully embrace research on adult students. In a content analysis of articles appearing in seven of the most widely circulated peer-reviewed higher education journals published between 1990 and 2003, Donaldson and Townsend (2007) found that only 1% of the 3,219 articles discussed adult learners. This absence of adult students is true of college choice research, as much of the theoretical and empirical literature on the college choice process of prospective students was designed and conducted with traditional-age students and within the context of residential four-year institutions. However, many of the same demographic and socioeconomic characteristics and cost constraints historically studied in

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college choice research may serve to inform us of similar information asymmetries and other barriers to higher education faced by older adults.

Reviews of the literature conducted over the past several decades have illustrated with a high degree of consistency that students' propensity to attend college generally (or a college type specifically) differs systematically by such demographic and academic characteristics as the students' age, gender, race/ethnicity, and prior academic achievement; by such socioeconomic characteristics as their parents' income, occupation, and educational attainment; and by such cost constraints as distance, tuition and fees, and the availability and types of financial aid awarded (Braxton, 1990; Heller, 1997; Hossler & Gallagher, 1987; Hossler, Braxton, & Coopersmith, 1989; Leslie & Brinkman, 1987, 1988; Paulsen, 1990, 1998; Perna, 2006). These differences in college attendance are often attributed to such barriers as academic underpreparedness, a broken financial aid system, and differential access to and accuracy of information on the benefits and costs of a college education (Perna, 2006).

Baby Boomers approaching retirement age presumably have different motivations for and expect different returns from taking coursework at postsecondary institutions than traditional-age students, yet limited evidence suggests that some of the known differences in the propensity to attend postsecondary institutions found among traditional-age students are common among older adults. For example, older adults' reliance on postsecondary institutions as providers of instruction appears to be a function of gender, age, educational attainment, and income (AARP, 2000). Based on a review of the literature, the American Council on Education (2007) adds race/ethnicity and geography to this list of predictors of older adults' participation in postsecondary education. These findings, however, are based on descriptive analyses of survey data, and further multivariate analysis is necessary to confirm these results and to understand the

unique influence of these factors on older adults' participation in formal coursework for personal interest and work-related reasons. This study seeks to reduce this gap in the literature by using a nationally representative dataset and multivariate analysis to examine the characteristics of older adults who choose to participate in formal coursework for personal interest or work-related reasons at postsecondary institutions and other providers.

Methods

Conceptual Framework

Following a long line of inquiry within college choice research (e.g., DesJardins, Ahlburg, & McCall, 2006; Long, 2004; Manski & Wise, 1983; Radner & Miller, 1975; Toutkoushian, 2001; Weiler, 1994), the decision among older adults to pursue formal coursework for personal or work-related reasons is examined in this study under the premise of consumer preference theory. In general terms, consumer preference theory is a rational decision-making model based on the available alternatives to an individual (i.e., his or her choice set) and his or her preferences among the alternatives (DesJardins & Toutkoushian, 2005). The individual's formation of preferences among the alternatives is based on the individual's expectations about the utility—or well being—that he or she will derive by selecting an alternative. The alternatives that the individual has available to him or her are conditional upon particular constraints (e.g., time, budget, or ability) either perceived or realized by the individual. The decision rule that guides the decision-making process is the maximization of utility under constraint.

In this study, the alternatives available to older adults are possible combinations (or bundles) of time per year devoted to formal personal interest or work-related courses and to a composite good representing other activities. Formally, the model of consumer behavior assumes

that an individual selects a particular bundle representing some combination of formal coursework and the composite good when the utility derived from this alternative is greater than the utility derived by choosing any of the other available bundles. For this study, the utility that an individual derives from a particular bundle of formal coursework and the composite good is a function of his or her demographic characteristics, socioeconomic characteristics, and a set of constraints. Although utility is not directly observable, the maximization of utility is inferred by an observed choice. In this study the observed choice is the number of hours over a 12-month period that the individual participates in formal coursework for personal interest or work-related reasons.

Under the premise of consumer preference theory, individuals are not expected to derive the same utility from a particular bundle of goods, have the same marginal rate of substitution (or tradeoff) between bundles of goods, or face the same set of constraints that determine the bundles of goods that are available to them (DesJardins & Toutkoushian, 2005). Given an older adult's particular constraints and the rate at which he or she is willing to exchange formal coursework for other activities, in some instances the individual may only be able to maximize his or her utility by choosing bundles that contain no personal interest or work-related coursework. This particular scenario—what economists refer to as a "corner solution" when diagramming utility functions (Pashigian, 1998)—is an important concept for understanding why some older adults never participate in formal coursework for personal interest or work-related reasons. The corner solution does not suggest that individuals are absent a preference for formal coursework, but rather that they face constraints that prohibit them from maximizing utility while taking such coursework. Taking the individual's preferences as given, movement "off of the corner" can only be altered by lessening the constraints imposed on the individual. This change

in the constraints introduces alternatives that allow the individual to maximize his or her utility by devoting some time to coursework for personal interest or work-related reasons. Consumer preference theory, specifically the concept of the corner solution, aids in the choice of analysis for this study and in the interpretation of study results.

Data and Sample

This study is based on the public-use data file from the Adult Education Survey of the 2005 administration of the National Household Education Surveys Program. Whereas other national postsecondary data sets are concentrated on the experiences of traditional-age and middle-age adults within credential programs, the Adult Education Survey provides perhaps the most comprehensive view of both the credit- and non-credit-based educational experiences of older adults at postsecondary institutions and other providers. This data set is uniquely relevant to the research question in this study, as commonly employed national datasets on postsecondary education and many postsecondary institutions themselves fail to recognize the formal lifelong learning experiences of older adults on their campuses (American Council on Education, 2007, 2008). As such, research using these data broadens our understanding of student flow by recognizing the educational demand and potential reemergence of a large segment of the adult population at postsecondary institutions.

The sample for this study is comprised of adults between the ages of 55 and 79 (unweighted N = 3,090, weighted N = 55,096,805) who participated in the Adult Education Survey of the National Household Education Surveys Program of 2005. Persons eligible for participation in the Adult Education Survey were those individuals ages 16 and older who were not enrolled in high school, not institutionalized, and not on active duty in the U.S. armed forces (Hagedorn, Montaquila, Carver, O'Donnell, & Chapman, 2006a). Surveys were completed by

8,904 individuals for an unweighted survey response rate of 75.3%. The sample of older adults employed in this study represents 34.7% of the total number of respondents.

Variables

The outcome under study is the total number of hours over the prior 12 months in which older adults participated in formal courses for personal interest or work-related reasons. Although some courses for personal interest or work-related reasons are offered for college credit, this type of formal learning is taken primarily on a non-credit basis and is not intended to be a part of a degree program. Examples of personal interest courses include personal finance, home computing, dance or music, health or fitness, and foreign languages. Examples of work-related courses include computer skills, communication, diversity, and stress management.

Respondents could list as many as 20 courses taken for personal interest or work-related reasons, but only as many as two courses for personal interest and four courses for work-related reasons were sampled for more in-depth questioning by the Adult Education Survey interviewer. Given this sampling of courses, NCES staff derived the total number of hours devoted to personal interest or work-related courses by applying a personal interest course weight and a work-related course weight to the number of hours that the individual participated in the subset of courses that were sampled by the interviewer (Hagedorn, Montaquila, Carver, O'Donnell, & Chapman, 2006b). Among the weighted sample, 74.3% of older individuals have zero hours of participation in personal interest and work-related coursework. The median number of hours of participation among those who participated in at least one formal course is 24.

Due to both the contradictory wording in the Adult Education Survey and the focus of this study on formal courses that are commonly provided at postsecondary institutions, 'informal religion/bible study' was removed from the outcome as a type of formal coursework taken for

personal interest or work-related reasons. As such, the hours that older adults devoted to this practice were recoded to zero before summing their hours across all formal coursework, and the weights for personal interest and work related courses were adjusted accordingly.

Following the conceptual model for this study and past research on the college choice process, variables representing demographic characteristics (i.e., age, gender, ethnicity, immigrant status, living arrangement, and locale), socioeconomic characteristics (i.e., education level, household income, and employment status), other commitments or constraints (i.e., physical or learning disability and extent of informal learning), and price are included as predictors in this study. Also included for the purposes of statistical control are a set of regional dummy variables to account for unobserved differences (e.g., climate or cultural) in participation levels across the country. Definitions of the study variables and their sources within the Adult Education Survey data file are provided in Table 1.

[Table 1 Here]

Analytic Procedures

The excess in the share of older adults who did not participate in any formal courses for personal interest or work-related reasons (74.3% of the weighted sample) is under-predicted by common methods of analyzing count data, such as Poisson regression or negative binomial regression (Long, 1997; Long & Freese, 2003). Specifically, Poisson regression and negative binomial regression assume that all individuals have a positive probability of participating in such coursework. This assumption that older adults do not participate "by chance only" does not make sense theoretically given the corner solution of the consumer preference model in which some older adults can only maximize their utility under constraint by choosing no units of personal interest or work-related coursework.

Given the limitations of Poisson regression and negative binomial regression, the number of hours spent participating in coursework for personal interest or work-related reasons is estimated by a hurdle regression model. The hurdle model, often used within the field of economics to address the corner solution, allows for the possibility that older adults have a perfect probability of having zero hours of participation in formal coursework by assuming that two underlying processes determine the hours spent on formal learning by older adults. The first process determines whether or not one will choose formal learning for personal interest or work-related reasons—i.e., jumping the hurdle. Conditional on having chosen to participate in this formal learning, the second process determines how many hours of such coursework one will pursue.

Each process in the hurdle model is represented by an independent equation. The choice of whether or not to pursue formal learning is estimated using a binary logit regression model. For this first equation, results are interpreted as ceteris paribus (i.e., all else being equal) changes in the odds of choosing to participate in formal coursework for personal interest or work-related reasons (Long, 1997; Long & Freese, 2003). The number of positive hours of formal coursework is then estimated using a zero-truncated negative binomial regression model. For this second equation, the negative binomial regression model is preferred over the Poisson regression model because the data are overdispersed—i.e., the conditional variance is much greater than the conditional mean. Results of this model are interpreted as ceteris paribus factor changes in the rate of participation in formal coursework for personal interest or work-related reasons given a one-unit change in the independent variable (Long, 1997; Long & Freese, 2003). Descriptive statistics for the variables appearing in both equations are reported in Table 2.

[Table 2 Here]

Although there may be theoretical reasons to assume that the two processes are dependent—for example, that unobserved characteristics have an influence on both the decision to participate and the decision on how much to participate—a review (Smith, 2003) of prior studies using hurdle models concludes that there is often insufficient statistical support to justify joint estimation over independent estimation of the two equations. When treated as independent processes, price can be included as a predictor within the zero-truncated negative binomial regression analysis so that the influence of price on the amount of positive hours of participation can be estimated (price is missing for individuals with zero hours of participation). This approach follows standard convention (Pudney, 1989) that the two processes are generated by different variables: personal characteristics serve as proxies for differences in tastes and preferences to predict the participation decision whereas economic variables predict the level of participation.

Both the binary logit regression and zero-truncated negative binomial regression equations are estimated with Stata Intercooled, Version 11. This version of Stata has survey (i.e., 'svy:') commands that allow for the requirements of complex survey designs—such as those procedures used in the sampling for the 2005 administration of the National Household Education Surveys Program—in the estimation of both binary logit regression models (i.e., the 'svy: logit' command) and zero-truncated negative binomial regression models (i.e., the 'svy: ztnb' command). Survey commands in Stata produce variance estimates using balanced repeated replication, jackknife, or Taylor linearization, all of which are recommended as methods for computing sampling errors for the 2005 National Household Education Surveys Program data (Hagedorn, Montaquila, Carver, O'Donnell, & Chapman, 2006a).

Limitations

There are several limitations to the data that may have an impact on the interpretation of the study results. First, because not all formal courses that older adults take for personal interest or work-related reasons are sampled to obtain information about such course characteristics as the number of hours of participation or the amount of personal expenses allocated for the course, we had to rely on personal interest and work-related course weights provided in the Adult Education Survey data to estimate this information for all courses taken during the 12-month period. These course weights implicitly assume that the unsampled courses are similar to the sampled courses, and such an assumption may not hold across all course characteristics.

Second, although it is reasonable to assume that the price that one would have to pay to attend a formal course for personal interest or work-related reasons would be a constraint on their decision to participate—and thus should appear as a predictor in the binary logit model predicting participation—we could not reasonably include an estimate of price for those older adults with zero hours of participation. Although successful attempts have been made in other college demand studies (e.g., DesJardins, Ahlburg, & McCall, 2006) to estimate a counterfactual price (e.g., financial aid received for non-applicants) using regression analysis and the demographic, socioeconomic, and academic characteristics of traditional-age college-bound students, our analysis of older adults attending largely non-credit-bearing courses suggests that course area and provider (neither of which are known or easily estimated for individuals with zero participation hours)— not the characteristics of older adults—are the primary determinants of price.

Finally, like all analyses based on historical data to forecast future demand, we must take note of the fact that there are limits to the generalizability of our study findings. Most of the older adults in the age group represented in our study fall into a generation that comes before and

that is considered (American Council on Education, 2007, 2008) to be qualitatively different from Baby Boomers. Our findings are limited by the extent to which these qualitative differences are not captured in our study (i.e., unobserved heterogeneity) and by the extent that the future context (e.g., economic and political) will be different from the time period represented in this study.

Results

Binary Logit Model for Decision to Participate

Unadjusted Parameter Estimates. Prior to estimating the full binary logit model, we entered into the model separately the predictor variables representing each construct of interest (See Table 3). For example, the continuous variable 'age' was entered into the model alone to estimate the relationship between older adults' age and their decision to participate in formal learning, whereas the dummy variables for full-time work and part-time work were entered into the model together to estimate the differences in the propensity to participate between full-time and part-time working adults and those not in the labor force. When each construct is entered separately, all but one (i.e., living alone) is statistically significantly related to older adults' chances of participating in formal learning. Specifically, being older, having a physical or learning disability, and living in a rural area decreases older adults' chances of participating in formal courses for personal interest or work-related reasons. Being female, being white, having been born in the U.S., having greater education and income levels, being in the labor force either full-time or part-time, and engaging in various types of informal learning increases older adults' chances of participating in this formal coursework.

[Table 3 Here]

Adjusted Parameter Estimates. After regressing older adults' decision to participate in formal learning on each construct separately, we estimated a full model to partial out the unique

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influence of each construct by statistically controlling for the influence of other predictors (See Table 3). The overall model was statistically significant ($F(15, 3031) = 26.71$; $Prob > F = 0.000$). Discussion of the results follows and is presented in order by demographic characteristics (i.e., age, gender, ethnicity, immigrant status, living arrangement, and rural locale) socioeconomic characteristics (i.e., education level, household income, and employment status) and other commitments or constraints (i.e., extent of informal learning and physical or learning disability).

With regard to differences by older adults' demographic characteristics, after statistically controlling for socioeconomic characteristics and for other commitments and constraints, all but one (i.e., race) of the adjusted relationships between demographic characteristics and the decision to participate in formal coursework remain statistically significant and in the same direction as the unadjusted relationships (with living alone being statistically non-significant in both the unadjusted and adjusted models). Specifically, all else being equal, older adults' odds of participating in formal coursework decrease by 2.4% for a one-year increase in age. Females have odds of participating in formal coursework that are 125.5% higher than the odds for males. Compared to their peers born in other countries, older adults who are born within the U.S. have 71.5% higher odds of participating in formal coursework. Older adults who live in rural locales have odds of participating in formal coursework that are 42.7% lower than the odds for those living in urban or suburban areas.

Regarding the relationships between socioeconomic characteristics and the decision to participate in formal coursework, after statistically controlling for other predictors, all of the adjusted parameter estimates are statistically significant and in the same direction as the unadjusted coefficients. In particular, the odds of participating in formal coursework as an older adult increase by 18.7% for a one-year increase in schooling, all else being equal. The odds of

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participating in formal coursework also increase by 40.2% for a one-unit change in the log income per household member. Compared to those older adults who are not in the labor force, working full-time increases the odds of participating in formal coursework by 247.8%, whereas working part-time increases the odds of participating in formal coursework by 145.0%.

Finally, regarding the relationships between other commitments and constraints and older adults' decision to participate in formal learning for personal interest or work-related reasons, the adjusted parameter estimate for having a physical or learning disability is statistically nonsignificant, whereas the estimate for the informal learning index remains statistically significant after statistically controlling for other predictors. Specifically, for a one-unit increase in the informal learning index, the odds of participating in formal coursework increase by 33.3%.

Zero-truncated Negative Binomial Regression for Positive Hours of Participation

Unadjusted Parameter Estimates. As with the binary logit model for the decision to participate in formal learning, prior to estimating the full zero-truncated negative binomial regression model, we entered into the model separately the predictor variables representing each construct of interest (See Table 4). To test the assumption that demographic and socioeconomic background and other personal commitments and constraints were not related to the extent of positive participation, we entered separately into the model all variables of interest from the binary logit model along with price variables and the regional dummy variables. Results of these unadjusted models support our assumption, as the demographic, socioeconomic and personal commitments and constraints variables are not significantly related to the positive rate of participation. Inversely related to the rate of positive participation, however, is the price per hour devoted to such coursework. Those who pay nothing to attend formal courses have a unique (and lower) rate of participation that distinguishes them from payers.

[Table 4 Here]

Adjusted Parameter Estimates. After regressing older adults' positive hours of participation in formal personal interest or work-related courses on each construct separately, we estimated a full model to partial out the unique influence of each construct by statistically controlling for the influence of other predictors (See Table 4). The overall model was statistically significant ($F(17, 1037) = 5.82$; Prob > F = 0.000). As expected, the demographic, socioeconomic and personal commitments and constraints variables, all which were statistically nonsignficant in the unadjusted models, similarly do not predict the number of positive hours of participation when controlling for other variables in the model. An adjusted Wald test for the entry of these variables in the model was statistically nonsignificant ($F(12, 1042) = 1.32$; Prob > F = 0.199). This finding reinforces the assumption that this is a two-part decision-making process, and that each part has its own unique set of predictors. Given this evidence, we opted for a more parsimonious model that included only price and the regional dummy variables to predict the positive number of hours of participation in formal coursework for personal interest and work-related reasons ($F(5, 1049) = 112.67$; Prob > F = 0.000).

After statistically controlling for regional differences in the positive participation rates of older adults, the log price per hour for participation in personal interest and work-related coursework remained inversely related to hours of participation. Specifically, the expected number of coursework hours decreases by 21.0% for a one-unit increase in the log price per hour to attend. As in the unadjusted model, those older adults who pay nothing to attend formal courses have a unique (and lower) rate of participation that distinguishes them from payers. Compared to older adults who pay out-of-pocket for tuition/fees and for other course materials

(e.g., books and art supplies), those individuals with no measured personal expenses have an expected number of hours of participation in formal coursework that is 65.3% lower.

Discussion

The purpose of this study was to examine the characteristics of older adults who choose to participate in formal coursework for personal interest or work-related reasons to help fulfill a need among postsecondary institutions for more information on the educational demand of this burgeoning market segment. Perhaps the most significant finding of this study is that, by analyzing educational demand as a two part process using the hurdle model (i.e., first choosing to participate and then choosing the extent of participation), we found some evidence to support the hypothesis that different factors are driving these decisions, at least in terms of the observable characteristics of the individuals and courses. Specifically, we found that the decision to participate is driven by demographic (e.g., age, gender, and locale) and socioeconomic variables (e.g., education level, household income, and employment status), and the decision about how much time to participate is driven by economic variables (i.e., price). Several of these findings are discussed in greater detail below.

Decision to Participate

The decision to participate in coursework for personal interest or work-related reasons is a function of age. Specifically, we found that older adults' chances of participating in formal coursework decrease with age. Although this finding might reflect differences in mobility by age due to such changes over time as retirement, decreasing health, or loss of a spouse, a number of these changes that affect older adults are being controlled for statistically in the model. It is possible that the remaining difference by age in older adults' chances of participating in formal coursework reflects attitudinal differences about such participation between Baby Boomers and

the previous "Silent Generation." At the time of data collection (i.e., 2005), the earliest Baby Boomers had reached the age of 59, whereas members of the Silent Generation were ages 60 through 79. If the speculation holds true that these differences in participation by age (i.e., after adjusting for health and life events) represent a generational gap, we would not expect to see any adjusted differences by age as Baby Boomers move further into the 55-79 age group.

The decision to participate in formal coursework is also a function of locale, with older adults who live in rural areas having significantly lower chances of participating than their peers living in urban or suburban areas. With such socioeconomic indicators as income, education, and employment controlled for statistically in the model, the difference in the decision to participate between older adults in rural and urban/suburban areas likely reflects differences in the awareness of and geographic access to providers of such coursework in these areas. Although this study includes other providers (e.g., private businesses, government agencies, public libraries, professional associations, and community or religious organizations) in addition to postsecondary institutions, in general the delivery of educational and other services in rural areas has been found to be hampered by such structural challenges as insufficient funding, a lack of coordination among providers, and a need for additional trained professionals (Fitzgerald, Coburn, & Dwyer, 2008).

Our findings also suggest that whether or not older adults participate in formal learning is a function of their educational level. By inserting the typical number of years to complete certain educational milestones into our regression equation (and holding all other variables constant at their mean values), we estimate that 9% of older adults with an 8th grade education pursue formal learning for personal interest or work-related reasons, compared to 16% with high school degrees, 21% with associate's degrees, 27% with bachelor's degrees, 35% with master's degrees,

and 51% with doctorates. This positive relationship between prior educational attainment and the decision to participate in formal learning as an older adult is important for providers of these courses, as education levels among older adults have been steadily increasing. According to the U.S. Census Bureau (1993, 2008b), the percentage of the population ages 55 and older with an associate's degree or more has increased from 18% to 32% between 1993 and 2008. As educational attainment continues to rise among older adults with a more highly-educated generation of Baby Boomers entering this age bracket, we would expect the demand for formal coursework for personal interest or work-related reasons to increase over the next decade.

Our findings also reveal that the decision to participate in formal learning for personal interest or work-related reasons is a function of household income, with older adults with higher household incomes having higher chances of participating. After statistically controlling for education level, employment status, and extent of informal learning (a proxy for motivation to learn), this positive income effect is the closest approximation we have on the economic constraints that prevent some older adults from moving from no participation (i.e., the corner solution) to positive hours of participation. In other words, given the limits of some older adults' disposable income, purchasing no units of formal coursework maximizes their utility. Assuming that household income is fixed, lowering the price of formal coursework should in theory compel some older adults to maximize their utility by attending one or more courses for personal interest or work-related reasons.

Our findings also suggest that the decision to participate is a function of employment status, with older adults who are working full-time or part-time having significantly higher chances of participating in formal coursework than their unemployed or retired peers. Entering values for employment status into our model, we estimate that only 13% of older adults not in

the labor force participate in formal learning, compared to 33% of full-time employed older adults and 26% of part-time employed older adults. To the extent that employers are serving as in-house providers of the coursework or are covering some of the costs of externally-provided training—and Adult Education Survey data (U.S. Department of Education, National Center for Education Statistics, 2005) suggest that approximately 36% of employed older adults who participate in formal coursework have such employer support—this investment in an older workforce is a positive sign against age discrimination in the workplace. It also serves as a positive sign that employers may be realizing the "experience dividend"—the phrase that Civic Ventures (2005) has coined to refer to the positive return on our reinvestment in the human capital of retirement-age Baby Boomers. To the extent that employed older adults are pursuing formal coursework without employer support—about 64% in 2005—this finding provides further evidence that older adults are already taking the initiative to retool for working well into traditional retirement years.

Positive Hours of Participation

The results of our study support the hypothesis that time spent participating in formal courses for personal interest or work-related reasons is a function of price. Specifically, we found empirical support for the law of demand—i.e., that quantity demanded is inversely related to price. What may at first seem contradictory to the aforementioned finding, however, is that, all else being equal, older adults who do not have to pay any out-of-pocket expenses to attend formal courses (i.e., price equals zero) participate in fewer hours of coursework over a 12-month period than their peers who personally bear some of the costs to attend. Given that we analyzed participation in formal coursework as a two-step process using a hurdle model (with price missing from our analysis of the decision to participate), we believe that this inverse relationship

between paying nothing to attend courses and the positive number of hours of coursework taken is an artifact of movement "off the corner." In the context of this study, the corner solution—i.e., choosing no hours of personal interest or work-related coursework—assumes that some older adults face constraints (e.g., budget) that prohibit them from maximizing utility while taking such coursework. Movement "off of the corner" can only be altered by lessening the constraints imposed on the individual, and this finding suggests that there are some older adults who will maximize utility by choosing positive hours of coursework only when price is set to zero through employer support or other means. Taken together, the evidence regarding the impact of household income and price suggests that, by lowering the price to attend courses through such means as offering need-based financial aid, pursuing grants to cover the costs of delivery, or finding corporate or other local sponsorship, providers could shift the financial constraint away from older adults, thus allowing them to pursue some (and in other cases more) hours of formal coursework.

Conclusion

Over the next decade, Baby Boomers will be reaching retirement age in large numbers and the U.S. will be undergoing one of the most significant demographic shifts in its history. This demographic shift has important implications for the role of higher education as a provider of lifelong learning and for the changing composition of postsecondary institutions. To help fulfill a need for more information on the educational demand of this unique market segment, this study used data from the 2005 National Household Education Survey and econometric modeling to examine the characteristics of older adults who choose to participate in formal coursework for personal interest or work-related reasons. The findings from this study suggest that the decision regarding whether or not to participate in formal courses for personal interest or

work-related reasons is driven by demographic (e.g., age, gender, and locale) and socioeconomic variables (e.g., education level, household income, and employment status), and the decision regarding the extent of participation in this formal coursework is driven by economic variables (i.e., price).

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Table 1.
Definitions and Sources of Study Variables

Dependent Variable

Formal Coursework: Hours per year spent participating in formal courses for personal interest or work-related reasons. Source: satime, wrtime.

Independent Variables

Age: Continuous variable, ranging from 55 to 79. Source: aage2004.

Female: Dummy coded variable. Source: sex.
- Female
- Male (Reference Group)

White: Dummy coded variable. Source: raceeth2.
- White
- Non-white (Reference Group)

Born in the U.S.: Dummy coded variable. Source: amoveage
- Born in the U.S.
- Immigrated to U.S. (Reference Group)

Living Alone: Dummy coded variable. Source: hhundr18, hh18over.
- Living alone
- Two or more individuals in the household (Reference group)

Rural Locale: Dummy coded variable based on Census 2000 mapping. Source: zipurb.
- Rural locale
- Urban/Suburban locale (Reference Group)

Years of schooling: Continuous variable, ranging from 0 to 22. Source: ibgrade, ibgrad1, ibgrad2.

ln(Income per Household Member): Continuous variable, calculated by taking the natural log of the ratio of household income to household size. Source: hincome, hhundr18, hh18over.

Employment Status: Dummy coded variables. Source: aelabor.
- Full-time employee
- Part-time employee
- Not in labor force (Reference Group)

Informal Learning Index: Sum of six dummy coded variables indicating involvement in informal learning through various means, such as: computer software or the Internet; books, audio tapes, videos or TV; how-to or consumer magazines; clubs or activity groups; conventions or conferences; or some other means. Weighted sample Cronbach's Alpha = 0.71. Source: picomp, piself, pimag, piclub, pishow, pioth.

Learning/Physical Disability: Dummy coded variable. Source: lrndisb, vishear, adisab05.
- Learning or physical disability
- No disability (Reference Group)

Table 1.
(Continued)

Region: Dummy coded variables based on Census 2000 mapping. Source: cenreg.

- Northeast
- South
- Midwest
- West

ln(Price per Course Hour): Continuous variable, calculated by taking the natural log of the ratio of total tuition/fees and books/materials to the total number of hours devoted to formal coursework. Source: wrtime, wrtuito1, wrmatls1, wrtuito2, wrmatls2, wrtuito3, wrmatls3, wrtuito4, wrmatls4, satime, satuito1, samatls1, satuito2, samatls2.

Price equals Zero: Dummy coded variable. Source: wrtime wrtuito1, wrmatls1, wrtuito2, wrmatls2, wrtuito3, wrmatls3, wrtuito4, wrmatls4, satime, satuito1, samatls1, satuito2, samatls2.

- Price per course hour = $0
- Price per course hour > $0 (Reference Group)

Table 2.
Weighted Descriptive Statistics for Study Variables

	Binary Logit Model		Zero-Truncated Negative Binomial Model	
	Mean	SD	Mean	SD
Age	64.882	7.073	62.368	6.429
Female	0.526	0.499	0.606	0.489
White	0.751	0.433	0.806	0.395
Born in the U.S.	0.908	0.289	0.941	0.236
Live alone	0.182	0.386	0.170	0.376
Rural locale	0.232	0.422	0.147	0.354
Years of schooling	13.063	3.345	15.050	2.998
ln(income/household member)	3.110	0.824	3.471	0.701
Working full-time	0.285	0.451	0.488	0.500
Working part-time	0.115	0.320	0.167	0.373
Informal learning index	1.784	1.667	2.693	1.722
Phys./Learning disability	0.235	0.424	0.184	0.388
Northeast region	0.174	0.379	0.150	0.357
South region	0.407	0.491	0.361	0.480
Midwest region	0.227	0.419	0.219	0.414
ln(price/hour)			1.064	1.314
Price is $0			0.486	0.500
Weighted N	55,096,805		14,173,675	

Table 3.
Binary Logit Regression Predicting Decision to Participate in Formal Coursework

	Unadjusted[a]		Adjusted[b]		
	B	SE	B	SE	OR[c]
Age	-0.074*	0.009	-0.025‡	0.010	0.976
Female	0.438*	0.110	0.813*	0.134	2.255
White	0.422†	0.144	0.142	0.162	1.152
Born in the U.S.	0.604‡	0.235	0.539‡	0.259	1.715
Live alone	-0.107	0.102	-0.098	0.129	0.907
Rural locale	-0.716*	0.148	-0.557†	0.175	0.573
Years of schooling	0.275*	0.019	0.171*	0.023	1.187
ln(income/household member)	0.863*	0.087	0.338†	0.098	1.402
Working full-time	1.512*	0.130	1.247*	0.158	3.478
Working part-time	1.226*	0.167	0.896*	0.187	2.450
Informal learning index	0.438*	0.033	0.287*	0.039	1.333
Phys./Learning disability	-0.404†	0.131	0.089	0.152	1.093
Northeast region	-0.694*	0.179	-0.585†	0.206	0.557
South region	-0.657*	0.148	-0.371‡	0.177	0.690
Midwest region	-0.547†	0.167	-0.454‡	0.197	0.635
Constant			-4.674	0.850	

* $p < 0.001$, † $p < 0.01$, ‡ $p < 0.05$

a. Parameter estimates are not adjusted by statistically controlling for other variables in the model; however, multiple variables representing one construct (e.g., labor force participation or region of the country) are entered into the model together.

b. Parameter estimates are adjusted by statistically controlling for other variables in the model.

c. Odds Ratio: The factor change in the odds of participating in formal coursework given a one-unit change in the predictor, holding all other variables constant.

Table 4.
Zero-Truncated Negative Binomial Regression Predicting Positive Hours of Formal Coursework

	Unadjusted[a]		Adjusted[b]		Adjusted[b] (Parsimonious)		
	B	SE	B	SE	B	SE	IRR[c]
Age	0.029	0.016	0.004	0.011			
Female	-0.014	0.209	-0.100	0.133			
White	-0.200	0.264	0.015	0.152			
Born in the U.S.	-0.513	0.459	-0.283	0.286			
Live alone	-0.230	0.152	-0.087	0.135			
Rural locale	0.435	0.322	0.269	0.195			
Years of schooling	0.017	0.024	0.005	0.020			
ln(income/household member)	0.073	0.100	-0.035	0.108			
Working full-time	-0.308	0.223	0.194	0.180			
Working part-time	-0.401	0.264	-0.065	0.181			
Informal learning index	0.120	0.063	0.070	0.041			
Phys./Learning disability	0.103	0.208	-0.011	0.125			
Northeast region	-0.945*	0.224	-0.716†	0.214	-0.763*	0.218	0.466
South region	-0.775*	0.214	-0.597†	0.200	-0.613†	0.211	0.542
Midwest region	-0.730†	0.237	-0.605†	0.223	-0.600†	0.218	0.549
ln(price/hour)	-0.273†	0.097	-0.278*	0.066	-0.242†	0.084	0.785
Price is $0	-1.360*	0.265	-1.210*	0.180	-1.204*	0.209	0.300
Constant			4.943	0.934	5.134	0.241	

* $p < 0.001$, † $p < 0.01$, ‡ $p < 0.05$

a. Parameter estimates are not adjusted by statistically controlling for other variables in the model; however, multiple variables representing one construct (e.g., labor force participation or region of the country) are entered into the model together.

b. Parameter estimates are adjusted by statistically controlling for other variables in the model.

c. Incidence-rate Ratio: The factor change in the expected positive rate of formal coursework taken given a one-unit change in the predictor, holding all other variables constant.